Lessons Learned in Fielding a UAS in the Combat Theater

NDIA 24th National Test and Evaluation Conference
Palm Springs, California

February 28th, 2008

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Approved for Public Release, Distribution Unlimited,
WPAFB 08-0222 Dated 5 February 2008
Introduction

I have been deployed five times in support of the Global War on Terror since September 11th 2001.

Supported Operation Enduring Freedom, Operation Iraqi Freedom, and Operation Southern Watch.

I supported the RQ4A “Global Hawk” High Altitude Long Endurance aircraft during these deployments.

These are some lessons learned that have since evolved into standard operations today.
Lessons learned Topics:

1. Pilot Intervention
2. Ground Crew
3. Environment
4. Need in the field
5. Risk of aircrew
1. Pilot Intervention

- The Fully Autonomous Air Vehicle
  - Pre launch
  - Mission plan
  - Command and control
- Command Shelter
  - Hand off
  - Aircrew cycle
- Pre Brief/Post Brief
  - Identify possible issues
  - Clarify mission need
  - Accurate fault or discrepancy description
1.1 The Fully Autonomous Air Vehicle

- **Pre Launch**
  - Preflight A/C and Shelter
  - Walk around
  - Outside impacts

- **Mission Plan**
  - A/C and Shelter Match
  - Last minute updates

- **Command and control**
  - LRE (Launch and Recovery Element)
  - Control Center
  - MCE (Mission Control Element)
1.2 Command Shelter

- Hand off
  - LRE launch
  - MCE Mission
  - LRE Recover

- Aircrew cycle
  - LRE
  - MCE
  - Crew rest
1.3 Pre Brief/ Post Brief (Pilots)

- Identify possible issues
  - Intermittent issues
  - Scheduled Maintenance
  - Known Comm/NAV interference
- Clarify mission need
  - SAR, EO/IR
  - Ground CDL
- Accurate fault or discrepancy description
  - Faults during mission
  - Post flight/mission data review
2. Ground Crew

- Preflight and Post flight
  - Inspections
  - Mission plan
  - Fault logs
- Scheduled Maintenance
  - Down time
  - Mission Cycle
- Pre Brief/ Post Brief
  - Identify possible issues
  - Clarify mission need
  - Accurate fault or discrepancy description
2.1 Preflight and Post flight

- Inspections
  - Electrical (VTC)
  - Mechanical
  - Servicing
- Mission plan
  - Loading
  - Check sum
- Fault logs
  - Download and save
  - Erase for new mission
  - Fault Isolation
2.2 Scheduled Maintenance

- **Down time**
  - Minor/Major
  - Equipment
  - Retest

- **Mission Cycle**
  - Schedule
  - Impact to next
2.3 Pre Brief/ Post Brief (Ground Crew)

- Identify possible issues
  - Recurring faults
  - Work a rounds
  - Mission cancel
- Clarify mission need
  - Payload(s)
  - Keying Requirements
- Accurate fault or discrepancy description
  - Trouble shooting time
  - Fault isolation
  - Lead time on replacements
3. Environment

- Climate
  - Maintenance time
  - Indoor/Outdoor
  - Mission Capable Limits

- Equipment
  - Availability
  - Special Equipment

- Part replacement
  - Hours on airframe
  - Lead Time.
3.1 Climate

- Maintenance time
  - Exposure to elements
  - Coincide with mission
  - 24 hour coverage

- Indoor/Outdoor
  - Time
  - Exposure to others

- Mission Capable Limits
  - Take off/ Landing
  - Visibility over target
3.2 Equipment

- **Availability**
  - On site
  - Loan from local unit
  - Sent from stateside

- **Special Equipment**
  - For that area
  - Power source (s)
  - COMSEC
3.3 Part replacement

- Hours on airframe
  - Increased cycle
  - Cost
  - Expand limits
- Lead Time.
  - Availability
  - Customs
  - Local Vendor
4. Need in the Field

- Battlefield Commander
  - Near real time Imagery
  - BDA
  - Re Direct
- Troops on Ground
  - More Intel
  - Direct download
- Long Endurance
  - Time in Theater
  - On Task
  - Flexibility
4.1 Battlefield Commander

- Near real time Imagery
  - Accurate ground troop placement
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- Near real time Imagery
  - Accurate ground troop placement
  - Air strike
IR Image: BDA from AC-130 Gunship Strike
Tora Bora Cave Complex, AF 10 Dec 01 / 0200L

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  - Air strike
  - Potential threats
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- Near real time Imagery
  - Accurate ground troop placement
  - Air strike
  - Potential threats

- BDA
  - Verification
  - New targets

- Re Direct
  - Capable to look outside of mission
  - Determined by BDA
  - Target of opportunity
IR Image: Eastern Afghanistan
02 May 02 / 0700L

APPROX 50 POSS PERSONNEL
4.2 Troops on Ground

- More Intel
  - Local Threats
  - BDA
  - Re Direct

- Direct download (Demo)
  - Hand held's
  - portable ground stations
4.2.1 Ground Laptop Interface (Demo)
### 4.3 Long Endurance

- **Time in Theater**
  - 19 to 30 hours (Average 24)
  - Distance from target area

- **On Task**
  - Coverage of active mission
  - Ongoing BDA

- **Flexibility**
  - To complete several missions
  - Support other Recon aircraft
  - Aircrew limitations
5. Risk of Air Crew

- Pilot Fatigue
  - Long Missions
  - Crew rest
  - Crew cycle
- Ground Station
  - Location
  - Flexibility
  - Divert safety

Safe at home station
Conclusion

• Performance = 95.8% single A/C turn around 4 hours.
• Efficiency = 91% example: 40 consecutive missions 100%
• Awards = Over a dozen and counting.
Questions